



10CFR50.73

Palo Verde Nuclear  
Generating Station

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192-01091-WEI/DGM/DFH  
July 18, 2001

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Mail Station P1-37  
Washington, DC 20555-0001

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Unit 3  
Docket No. STN 50-530  
License No. NPF-74  
Licensee Event Report 2001-001-00**

Attached please find Licensee Event Report (LER) 50-530/2001-001-00, prepared and submitted pursuant to 10CFR50.73. This LER reports an automatic reactor trip that occurred on May 19, 2001. The corrective actions described in this LER are not necessary to maintain compliance with regulations and this letter makes no commitments to the NRC.

In accordance with 10CFR50.73(d), a copy of this LER is being forwarded to the Regional Administrator, NRC Region IV and the Resident Inspector. If you have questions regarding this submittal, please contact Daniel G. Marks, Section Leader, Regulatory Affairs, at (623) 393-6492.

Sincerely,

WEI/DGM/DFH/kg

Attachment

cc: E. W. Merschoff (all with attachment)  
J. H. Moorman  
L. R. Wharton  
INPO Records Center

IE22

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)

Palo Verde Nuclear Generating Station Unit 3

DOCKET NUMBER (2)

05000530

PAGE (3)

1 OF 5

TITLE (4)

## Automatic Reactor Trip Due To Unforeseen Problems Controlling ASI

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	19	2001	2001	001	00	07	18	2001	N/A	
OPERATING MODE (9) 1			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)	
			20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)	
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71	
			20.2203(a)(2)(ii)		20.2203(a)(4)		X 50.73(a)(2)(iv)		OTHER	
POWER LEVEL (10) 19			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A	
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)			

## LICENSEE CONTACT FOR THIS LER (12)

NAME

Daniel G. Marks, Section Leader, Regulatory Affairs

TELEPHONE NUMBER (Include Area Code)

623-393-6492

## COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

## SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO
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## EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On May 19, 2001 at 0306 Mountain Standard Time (MST), Unit 3 was in MODE 1 (Power Operation), at approximately 19 percent rated thermal power when the reactor automatically tripped on an Axial Shape Index (ASI) auxiliary trip signal from the Core Protection Calculator (CPC). Unit 3 was operating at 19 percent power to accommodate corrective maintenance to resolve a high vibration problem on the main turbine. The root cause of the trip was that the downpower game plan did not include CPC ASI predictions, Axial Offset Anomaly (AOA) effects on ASI, or previous downpower differences between predicted ASI and the core operating limit supervisory system (COLSS) ASI.

There has been one similar event reported within the last three years in LER 2-2000-007-00.

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**LICENSEE EVENT REPORT (LER)**  
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		<b>2001</b>	<b>- 001</b>	<b>- 00</b>	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

### 1. REPORTING REQUIREMENT(S):

APS is reporting this condition pursuant to 10CFR50.73(a)(2)(iv) as an event or condition that resulted in a manual or automatic actuation of the reactor protection system (RPS) (EISS:JC), which is an engineered safety feature (ESF)(EISS:JE).

### 2. DESCRIPTION OF STRUCTURES, SYSTEMS, COMPONENTS AND TERMS:

The CPC (core protection calculator) (EISS:JC) system monitors pertinent reactor core conditions and provides an accurate, reliable means of initiating a reactor trip. The CPC system is an integral part of the plant protective system (EISS:JC) in that it provides two trips to the RPS, Departure from Nucleate Boiling Ratio (DNBR) and Local Power Density (LPD). Trip signals are provided to the RPS whenever the minimum departure from nucleate boiling ratio (DNBR) or fuel design limit Local Power Density is approached during reactor operation.

The core operating limit supervisory system (COLSS) (EISS:ID) is a digital computer based on-line monitoring program used to provide information to aid the operator in complying with the technical specification operating limits on rated thermal power (total core power), linear heat rate, departure from nucleate boiling ratio (DNBR), axial shape index (ASI), and azimuthal power tilt. To do so, COLSS uses measurements of incore detector signals, control element assembly positions and plant thermal/hydraulic properties to determine the core power distribution and thermal performance. No trip functions are provided by this system.

Axial Shape Index (ASI) is the calculated difference between power generation in the two core halves (top and bottom). A CPC calculated ASI auxiliary trip is provided to trip the reactor when the CPC ASI falls outside of the nominal "Operating Space". The normal "Operating Space" is  $< +0.5$  and  $> -0.5$ . This ASI trip takes the form of Low DNBR and High LPD Channel trip contacts opening. Tripping the CPCs in this manner is known as an "Auxiliary Trip", since no detailed DNBR or LPD calculations are actually performed.

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### 3. INITIAL PLANT CONDITIONS:

On May 19, 2001 at 0306 Mountain Standard Time (MST), Unit 3 was in MODE 1 (Power Operation), at approximately 19 percent rated thermal power when the reactor tripped on a valid CPC Auxiliary ASI signal. Prior to the reactor trip, on May 18, 2001 at approximately 2220 MST, Unit 3 commenced a planned power reduction to perform maintenance to reduce vibration on the number 6 main turbine bearing.

### 4. EVENT DESCRIPTION:

On May 18, 2001 at 2220 Unit 3 ( $\approx$  2/3 cycle) commenced a planned power reduction from 100 percent power to 19 percent power in preparation to remove the main turbine (EIS:TA) from service to perform maintenance to reduce vibration on the number 6 main turbine bearing. Initially during the downpower, the Core Operating Limit Supervisory System (COLSS)(EIS:ID) measured ASI at a lower magnitude than the predicted ASI value. By 0305 on May 19, 2001, as the downpower evolution approached 19 percent power, predicted ASI was -0.179 and COLSS measured ASI was -0.281. A control room operator noted Channel "D" CPC ASI reading -0.48 and the other three channels were approximately -0.44. The crew inserted control element assembly (CEA)(EIS:AA) regulating group 5, followed by group "P" in an effort to control the CPC ASI value within the auxiliary trip setpoint of -0.50. The reactor tripped on a CPC generated Auxiliary ASI trip within seconds of group "P" insertion. The crew entered standard post trip actions and diagnosed an uncomplicated reactor trip.

### 5. ASSESSMENT OF SAFETY CONSEQUENCES:

Plant performance during the reactor trip was as expected, with no challenges to any safety function. Analysis of the available data indicates that the RPS responded as required for this event. A reactor trip was generated by the CPCs due to an auxiliary ASI trip. The trip occurred at the proper setpoint and was received within the required time response.

Subsequent to the reactor trip, the plant responded as expected. The reactor trip was uncomplicated, no safety limits were exceeded, and the event was bounded by current

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safety analyses. Primary and secondary pressure boundary limits were not exceeded as a result of the reactor trip. The transient did not cause any violation of the safety limits (i.e., departure from nucleate boiling ratio, linear heat rate, or RCS pressure). Therefore, there were no adverse safety consequences or implications as a result of this event. This event did not adversely affect the safe operation of the plant or health and safety of the public. The condition would not have prevented the fulfillment of a safety function, and the condition did not result in a safety system functional failure as defined by 10CFR50.73(a)(2)(v).

#### 6. CAUSE OF THE EVENT:

Unit 3 tripped on a CPC generated ASI auxiliary trip while stable at 19% power. The root cause of the trip was that the planning of the unit power reduction did not include all factors concerning ASI. The plan was generated to reduce power to 19% to take the main turbine off line for vibration adjustments. The plan, as presented to station management, did not include CPC hot pin ASI predictions, Axial Offset Anomaly (AOA) effects on ASI, or previous downpower differences between predicted ASI and COLSS ASI.

#### 7. CORRECTIVE ACTIONS:

Immediately following the reactor trip, Reactor Engineering verified that the 4 channels of CPC addressable constants were correct which eliminated it as a possible cause. To ensure power maneuver plans in the future include predictions for CPC hot pin ASI along with COLSS predicted ASI, procedures 72DP-9ZZ02, "Reactor Engineering Program " and 40OP-9ZZ05, "Power Operation," will be revised. The Operations procedure will include a requirement for monitoring CPC hot pin ASI on power maneuvers and include a caution that CPC hot pin ASI can read considerably different (by as much as -0.2 on a downpower) than COLSS ASI, especially when CEAs are heavily inserted. The changes to the operating procedure will be communicated to licensed operators during requalification training and initial training.

#### 8. PREVIOUS SIMILAR EVENTS:

There has been one similar event reported within the last three years in LER 2-2000-007-00, Reactor Trip Due to Licensed Operator Cognitive Error. Both Reactor trips occurred

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during a plant transient and involved a CPC auxiliary trip. However, the root cause of the trip described in LER 2-2000-007 is different than the one described in this LER, as such, the corrective actions in the previous LER would not have been expected to prevent recurrence of this LER.